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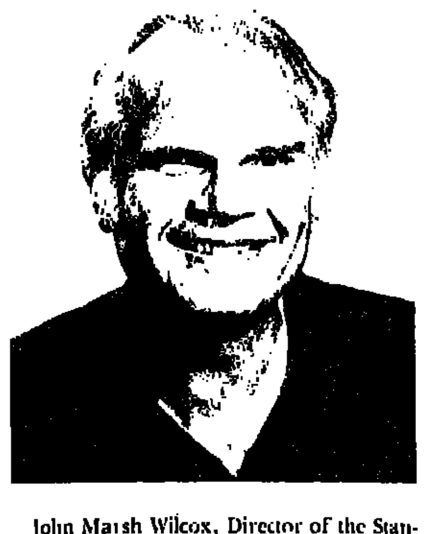
Particles and Fields—Interplanetary Space

Particles and Fields—Ionosphere

John M. Wilcox 1925–1983



John Marsh Wilcox, Director of the Stanford Solar Observatory, died while swimming in surf in the Sea of Cortez near Puerto Penasco, Mexico, on October 14, 1983. He was 58 years old.

A solar physicist specializing in the study of magnetic fields at the solar surface and in the interplanetary medium, Wilcox authored or coauthored over 100 scientific publications. Over the past decade, working with various associates, Wilcox found that there is a yet-unexplained connection between the sector boundaries of the interplanetary magnetic field and the areas of strong vorticity in the circulation of the earth's atmosphere at the lower boundary of the stratosphere. The effect, though small and of changeable magnitude, is of great theoretical interest.

Born in 1925, John Wilcox received his undergraduate education at Iowa State, and later obtained his Ph.D. in Physics from U.C., Berkeley in 1954. Professor Wilcox, in his early years, worked with Hannes Alfvén, helping with the first laboratory observations of Alfvén waves. He later turned his attention to the Sun and interplanetary medium and their influence upon the earth. He pioneered many studies of global solar structure, that is, viewing large scale solar phenomena (sectors, unipolar magnetic regions, etc.) and ignoring small scale structures (flares, spots, etc.) whose study was much in vogue in the 1960's. Working with Norman Ness, this approach bore fruit as the interplanetary medium, during most moderate levels of solar activity, was found to be ordered into large scale magnetic structures which John Wilcox called sectors. He worked with Robert Howard of Mount Wilson and showed that these structures were also found on the sun.

In May 1981 Wilcox and his close associate Philip H. Scherrer discovered a method for identifying solar flares deemed likely to affect the earth's ionosphere, and through this to disturb global short-wave radio communications. Those flares occurring in a southward pointing magnetic field tended to produce the ionospheric response, while those oppositely directed did not.

Wilcox will be remembered by many of his colleagues at the numerous meetings he attended, sporting a bright bowtie and a smile to match, discussing the latest findings on sector related phenomena. These extend from cosmic rays, possibly to weather phenomena, which had been the object of many of John's recent studies.

The Stanford Solar Observatory was designed and built under Wilcox and Scherrer's direction and to specifications laid down by his research team. It enables extremely high accuracy observations of the sun's net magnetic field, observed in its total sunlight, as though it were a distant star. In collaboration with colleagues in the Crimean Astrophysical Observatory in the USSR, the Stanford group showed phase coherence in the velocity field oscillations.

Organizer and participant in national and international scientific meetings, Wilcox played an especially important role in the meetings of the American Geophysical Union. He was General Chairman of the Fall Meetings in 1978–79. He served as secretary of the Section on Interplanetary Physics in 1970–74, and in 1973–75 as an associate editor of the Journal of Geophysical Research.

He was active in meetings and symposia of the International Astronomical Union and the International Union of Geodesy and Geophysics. He also chaired the US participation in the US-USSR Bilateral Cooperation under the Environmental Working Group VIII from 1973 to 1979. He was an important and influential member of the Steering Committee for the International Symposium on Solar-Terrestrial Influences on Weather and Climate in Boulder in 1982. For some years he carried out the duties of a Members' Representative to the University Corporation for Atmospheric Research from Stanford University.

He is remembered by his students at Berkeley through the many pleasant evenings spent at "beer busts" at his house in the Berkeley hills. He tended to be a keen observer of life and related many of his observations during walks in the hills amidst the Eucalyptii. He was proud of the fact that he had completed President Kennedy's 50 mile walk in the 1960's.

In addition to the great wealth of papers published, his influence will be most strongly felt by the many lives he touched. Wilcox was known to his scientific associates not only for his research accomplishments but for "his gentle manner of giving help to us when needed," as a group of Boulder scientists put it in a telegram of condolences at the occasion of his memorial service. He was a talented artist at the clarinet, and a person with a deep love for chamber music. At home, and wherever he traveled, he made time for musical events, especially when they involved small ensembles of great quality.

Wilcox is survived by his wife Ann, daughter Sharon, son David, and brothers William and Ralph.

Stanford University has created the John Marsh Wilcox Fund, to which donations may be made in his memory. The fund is dedicated to the acquisition of library materials for the Solar Observatory in the field of solar-terrestrial physics.

This tribute was written by Walter Orr Roberts, *who is with the University Corporation for Atmospheric Research, Boulder, CO 80307, and* Kenneth Howard Schatten, *who is with the NASA Goddard Space Flight Center, Greenbelt, MD 20771.*

News

IRAS: Taking Inventory

Even though its active life has ended, the Infrared Astronomical Satellite (IRAS) continues to make new discoveries as scientists at the Jet Propulsion Laboratory in Pasadena, Calif., pore over data from the orbiting satellite's year-long survey of the infrared universe. IRAS ran out of the cryogenic fluid that kept its telescope and detectors cold enough for sensitive, infrared observations last November, thus ending the survey phase of the international project. Now begins the detailed study of IRAS data and the preparation of maps and catalogues of all infrared sources found by the satellite for distribution to the scientific community.

Among the discoveries already credited to IRAS are a ring of solid particles, possibly an evolving solar system, around the bright star Vega; six previously unknown comets; three narrow rings of dust lying within the plane of the solar system that may be the remains of asteroid or comet collisions; a small body designated 1983 TB that appears to be the burned-out cometary source of the annual Geminid meteor shower, and which passes closer to the sun at its perihelion than any planet or known asteroid; and many new and fascinating stellar and galactic sources.

Now IRAS scientists have added to the list another possible "proto-solar system" around the southern-hemisphere star Fomalhaut. A dimmer, cooler star than Vega, Fomalhaut shows an excess of infrared radiation surrounding it to a distance of approximately 80 astronomical units (sun-earth distances), just as Vega did. That excess is interpreted as the re-radiation of heat energy by solid particles, at least the size of grains of sand, surrounding the star, again like Vega. The particles could be as large as asteroids, but not as large as earth-type planets. Heat energy from the planets of our own solar system would be invisible to an infrared telescope observing from Fomelhaut because of their low ratio of surface area to volume.

Beyond the fact that there is something surrounding both stars, though, IRAS can't tell very much, and recent observations using the National Aeronautics and Space Administration's (NASA) Kuiper Airborne Observatory have provided conflicting evidence on whether the particles around Vega are sand-sized or whether they are smaller. Because Vega, Fomelhaut, and the sun are all in different stages of development, and because there are other stars in the IRAS survey with infrared excesses that may turn out to be best explained as Vega-type systems, some IRAS team members, like Program Scientist Nancy Boggess of NASA headquarters, hope that "after the data are processed well, we'll have a whole range of these systems in earlier or later stages of development to better understand planetary formation."

Asteroids are also turning up in the survey in big numbers—about 20,000 so far, which compares well with the 20,000 to 50,000 that IRAS team members expect to find once the full inventory is taken. The method of asteroid-hunting is to look for objects that appear in only one of the survey's four identical scans, then to see if it turns up in another location in another scan taken at a different time. There are several possible explanations for an object that appears to move in this way—comet, asteroid, space debris, or even an artifact in the data—but an intriguing possibility is that one of them will turn out to be the 10th planet that some astronomers have theorized from observed perturbations in the motions of Uranus and Neptune. "There are many things that have appeared only once in the survey," says Boggess, "and the search is on."—*TR*

Permafrost Research

Among the highest priorities for permafrost research in the next 2 decades will be the improvement of detection and mapping techniques, the evaluation of engineering practices in frozen regions, and the establishment of a multidisciplinary program to observe the "active layer" just above the permafrost; these are the conclusions of a new report by the National Research Council's (NRC) Polar Research Board as part of its continuing effort to set guidelines for scientific research in polar regions.

Like an earlier NRC report on Antarctic science (*Eos*, October 18, 1983, p. 596), the new study ranks the most pressing research priorities in an era of tight budgets. The 103-page study, entitled *Permafrost Research: An Assesment of Future Needs*, was prepared by the Polar Research Board's Committee on Permafrost, with the advice of scientists and engineers from state and federal agencies, private industry, and universities.

Permafrost is defined as ground that remains continuously below 0°C for a period of 2 years or more. Nearly a quarter of the earth's land surface qualifies under that definition—it occurs below the sea on continental shelves, in high mountains, and on northern continents (where it is as thick as 700 m in some places). It also became the object of great scientific interest and considerable frustration on the part of engineers during the construction of the Alaska oil pipeline in the 1970's.

The first priority set by the NRC committee would be to improve the detection and mapping of both land and subsea permafrost and to gather data on its thickness, composition, temperature, and geological setting. Specifically, the report recommends that a "modest" drilling and temperature measurement program be established for different types of permafrost. Subsea drilling and probing programs could benefit from cooperation between government and industry in offshore oil-producing regions of Alaska, the report said.

The committee next calls for a refinement of existing models of heat and mass transport in permafrost, necessary for understanding its response to natural and human disturbances. A third priority is to establish a program to monitor existing structures like bridges and buildings constructed over permafrost to gain knowledge about engineering strengths or weaknesses.

Identifying and classifying the ground ice contained in permafrost is the next item on the list, which is arranged "approximately in order of decreasing priority," although "all major recommendations merit continuing attention and support." This is followed by the creation of a multidisciplinary program, involving both physical scientists and biologists, to observe the active layer above the permafrost that thaws during the summer.

The report further calls for an increased understanding of the physical and chemical properties of frozen ground—how, for example, it handles mechanical stresses and strains—and for improvements in permafrost technology, centralization of information banks, and international cooperation among researchers working in the field. Because study of permafrost is a good tool for measuring climatic change, the committee also recommends an expansion of the network of meteorological stations in permafrost regions.

The National Research Council is the research arm of the National Academy of Sciences. Copies of the permafrost report are available in limited quantity from the Polar Research Board, 2101 Constitution Ave., N.W., Washington, DC 20418.—*TR*

South Pacific Mineral Cache

Recent deep-water sampling of mineral-rich crusts on the seafloor between the Hawaiian Islands and Samoa revealed deposits of cobalt, nickel, and manganese that are richer than previous samples, according to a team of scientists from the U.S. Geological Survey (USGS) and the Federal Republic of Germany aboard the research vessel *S. P. Lee*.

Thin pieces of crust dredged from a seamount about 260 km northwest of Palmyra Atoll and Kingman Reef (U.S. territorial possessions roughly midway between Honolulu and American Samoa) had a cobalt concentration of 2.5%, or more than twice the concentration that earlier reconnaissance studies indicated would be found. The rock samples also contained 0.8% nickel and 32% manganese, compared to the estimated concentrations of 0.5% and 25%, respectively. The areas in which the deposits were found are part of the relatively unexplored ocean bottom included in the recently proclaimed 200-nautical-mile U.S. Exclusive Economic Zone (EEZ).

High concentrations of cobalt on seamounts northwest of Johnson Island were also confirmed by the marine geologists. Concentrations of cobalt, nickel, and manganese in the metallic crusts increase southward from Hawaii and reach a maximum on seamounts just north of the equator, they found. USGS scientists cautioned, however, that the relationships between metallic crust thickness, seamount type, geological structure, topography, and water depth are more complex than had been thought based on earlier work.

The U.S. has no domestic sources of cobalt, which is used in superalloys, magnetic materials, welding and hardfacing alloys, armor plate, cutting tools, and high-speed and wear-resistant steels. U.S. supplies currently are shipped mainly from central Africa.

Geophysicists

William P. Bishop was appointed deputy assistant administrator for satellites in the National Environmental Satellite, Data, and Information Service (NESDIS), part of the National Oceanic and Atmospheric Administration. His previous positions include deputy director of the life sciences division of the National Aeronautics and Space Administration (NASA), deputy director of the NASA environmental observations division, and assistant director for waste management of the Nuclear Regulatory Commission's division of fuel cycle and materials safety.

Bruce A. Bolt, professor of seismology and director of the seismographic stations at the University of California, Berkeley, was reelected president of the California Academy of Sciences by the trustees. He also was elected vice chairman of the California Seismic Safety Commission.

Charles C. Counselman III, a professor in planetary science at the Massachusetts Institute of Technology, was awarded the 1983 Carl Pulfrich Prize for his pioneering theoretical and pratical work in the field of surveying and geodesy. The biennial, international award was founded in 1968 to promote scientific, technical, and commercial application activities in surveying. The award is named in honor of the man who was responsible for many significant advances in geoetic and photogrammetric instruments in the late 1890's and early 1900's. Counselman is the first American to win the prize.

In Memoriam

The following AGU members are recently deceased. Their primary section affiliation and year they joined AGU are given.

Robert C. Gunton, 63, Solar-Planetary Relationships, 1969.

Herbert E. Hudson, 73, Hydrology, 1957.

John S. Ivy, 85, Seismology, 1947.

Forrest C. Neil, 34, Hydrology (student member), 1983.

Rikio Maeda, 53, Geomagnetism and Paleomagnetism, 1967.

Congress Reconvenes

Bills on geophysics-related topics are among the items facing legislators as they reconvene this week for the second session of the 98th Congress. A status report on some of those bills appears in this issue in the new "Legislative Update" column, which will be published regularly in *Eos* to keep readers abreast of pending legislation relevant to geophysics.

Pertinent issues for the coming session include education, trade, and some environmental laws. Education, which promises to be a campaign issue in this election year, most recently became a topic of national attention

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in late spring 1982 (*Eos*, June 15, 1982, p. 538). Since then, numerous bills have been introduced in Congress to allocate more funds to precollege science and mathematics education. One such bill is the Emergency Mathematics and Science Education Act (H.R. 1310)

On June 1, President Ronald Reagan proposed to create a Department of International Trade and Industry by merging the U.S. Trade Representative office with most of the Department of Commerce. The proposal also called for the National Oceanic and Atmospheric Administration (NOAA), currently an agency of the Commerce Department, to become an independent agency, similar to the National Science Foundation (NSF) (*Eos*, September 6, 1983, p. 537). A handful of bills aimed at creating a trade department were introduced in the first congressional session, each with a slightly different theme. NOAA's disposition hinges not only on the fate of these bills, but also on another bill, the NOAA Organic Act (H.R. 3381).

Bills reauthorizing the Clean Air and Clean Water acts also need more work during the second session. The Clean Air Act remains in committee in both the House and the Senate; the Clean Water Act, still in committee in the House, awaits action on the Senate floor.

The budgets for the National Aeronautics and Space Administration, NSF, the U.S. Geological Survey, and NOAA were all finalized before Congress recessed on November 18 (*Eos*, October 4, 1983, p. 577; November 8, 1983, p. 635; January 10, 1984, p. 9; and January 17, 1984, p. 17). Some of those budgets were not signed into law until after Thanksgiving, however. Three appropriations bills—for foreign aid, agriculture, and the treasury and postal service—still await completion in the second session.—*BTR*

In Congress

Legislative Update

	Senate	House
ARCTIC RESEARCH AND POLICY ACT, H.R. 2292 (Young, R-Alaska) and S. 373 (Murkowski, R-Alaska), would provide comprehensive national policy dealing with national needs and objectives in Arctic and would provide a centralized system for collection and retrieval of scientific data, establish priorities, and provide financial support for basic and applied scientific research. Senate version created a 5-person Arctic Science Council to establish policy and a 9-member commission to make research grants. Also authorized $25 million per year for 5 years. House Science and Technology Committee reported a new version that would establish a 6-member Arctic Research Commission responsible for developing policy and advising government agencies.	Passed June 27, 1983	Reported Nov. 10, 1983
EARTHQUAKES HAZARDS REDUCTION ACT, H.R. 2465 (Walgren, D-Pa.) and S. 820 (Gorton, R-Wash.), would authorize $67 million for fiscal 1984 and a 5% increase for inflation for fiscal 1985. Reported from House Committee on Interior and Insular Affairs May 10, 1983, and from House Committee on Science and Technology May 16, 1983.	Passed April 7, 1983	To be scheduled on House calendar
EXCLUSIVE ECONOMIC ZONE IMPLEMENTATION ACT, H.R. 2061 (Breaux, D-La.) and S. 750 (Stevens, R-Alaska), would implement 200 mile EEZ adjacent to the U.S. territorial sea. Would also set forth U.S. policy on development and use of the natural resources and ocean floor. H.R. 2061 referred to House committees on Foreign Affairs, Interior and Insular Affairs, Merchant Marine and Fisheries, and Ways and Means. S. 750 referred to Senate Committee on Commerce, Science, and Transportation.	Hearings to be scheduled	Hearings to be scheduled
EXPORT ADMINISTRATION ACT AMENDMENTS, H.R. 3231 (Bonker, D-Wash.) and S. 979 (Heinz, R-Pa.), defines restrictions on the export of scientific and technical information. House passed its bill Oct. 27, 1983, and sent it to the Senate. Senate bill also awaiting floor action. An extension to the Export Administration Act (H.R. 4476) was passed by both the House and Senate Nov. 18, 1983, and was signed into law (P.L. 98-207) Dec. 5, 1983. This measure extends the president's controls which expired Sept. 30, 1983, through Feb. 29, 1984.	Awaiting floor action	Passed Oct. 27, 1983
NATIONAL ACID DEPOSITION CONTROL ACT OF 1983, H.R. 4404 (D'Amours, D-N.H.), would amend the Clean Air Act. Proposes to reduce sulfur dioxide emissions by 12 million tons in 10 years and to reduce nitrogen oxide emissions by 4 million tons by 1995 with the goal of reducing acid deposition. Complements H.R. 3400, the Waxman (D-Calif.) acid rain bill. The Waxman bill is likely to override H.R. 4404.	No companion bill	Awaiting committee action
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION ORGANIC ACT, H.R. 3381 (Forsythe, R-N.J.), would establish NOAA as an independent agency and as the agency principally responsible for providing oceanic, coastal, and atmospheric services and supporting research (*Eos*, Sept. 6, 1983, p. 537). Would also establish procedures to avoid duplication of effort in these fields among government agencies. Referred to two subcommittees of House Merchant Marine and Fisheries Committee and one of House Committee on Science and Technology. Several bills that would establish a Department of Trade also call for making NOAA a separate agency.	No companion bill	Ordered out of Merchant Marine and Fisheries Committee Nov. 1, 1983. Awaiting action in Science and Technology Committee
NATIONAL OCEANS POLICY COMMISSION ACT OF 1983, H.R. 2853 (W. Jones, D-N.C.) and S. 1238 (Hollings, D-S.C.), would establish a 15-member commission that would develop recommendations for Congress and the President on a comprehensive national oceans policy. S. 1238 referred to Senate Commerce, Science, and Transportation Committee.	Awaiting committee action	Passed Oct. 31, 1983
NATIONAL TECHNOLOGY FOUNDATION ACT, H.R. 481 (Brown, D-Calif.), would establish a National Technology Foundation that aims to fill the gap between basic science and the marketplace. Would fold into the new foundation the parts of the National Science Foundation, the Commerce Department, and the National Bureau of Standards dealing with innovation and technology development. Referred to House Science and Technology Committee.	No companion bill	Awaiting committee action
SCIENCE AND MATHEMATICS EDUCATION, H.R. 1310 (Perkins, D-Ky.) and S. 1285 (Hatch, R-Utah). H.R. 1310 allocated $425 million for mathematics and science education in fiscal 1984 (*Eos*, March 22, 1983, p. 140). Senate bill, which also would authorize $425 million, was reported out of the Senate Labor and Human Resources Committee May 16, 1983.	To be scheduled on Senate calendar	Passed March 2, 1983
SEVERE STORMS ADVISORY COMMITTEE ACT, H.R. 3207 (Hammerschmidt, R-Ark.), aims to assure that forecasting of severe storms within government agencies is coordinated for maximum benefit. Would establish a committee of no more than 12 members that would recommend new programs, assess current forecasting programs, and make recommendations for incorporating new technology developments into the operational forecasting system. Referred to House Science and Technology Committee.	No companion bill	Awaiting committee action

For additional information, contact the sponsoring Member of Congress or committee indicated. All congressional and committee offices may be reached by telephoning 202-224-3121. For guidelines on writing to a member of Congress, refer to *AGU's Guide to Legislative Information and Contacts*, available free of charge from the AGU Member Programs Division (telephone: 800-424-2488 or 202-462-6903).—*BTR*

Classified

RATES PER LINE

Positions Available, Services, Supplies, Courses, and Announcements: first insertion $5.00, additional insertions $4.25.

Positions Wanted: first insertion $2.00, additional insertions $1.50

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Replies to ads with box numbers should be addressed to Box ___, American Geophysical Union, 2000 Florida Avenue, N.W., Washington, DC 20009.

For more information, call **202-462-6903 or toll free 800-424-2488.**

POSITIONS AVAILABLE

Massachusetts Institute of Technology, Haystack Observatory:Scientist/Engineer. The Haystack Observatory is seeking a Scientist/Engineer to work in the field of Very Long Baseline Interferometry (VLBI). The Scientist/Engineer would assist in the development of new VLBI data acquisition electronics as well as assist with the processing and analysis of data taken for the NASA Crustal Dynamics Project. The applicant should have a Ph.D. or its equivalent in radio astronomy or related field. Some engineering knowledge and experience with electronics is needed and a knowledge of computer and microprocessor programming would be an asset.

Please write, enclosing resumes to:

J.T. Karaku
Assistant to the Director
Haystack Observatory
Westford, MA 01886.

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University of Kentucky. The Department of Geology invites applications for two tenure track faculty positions. Areas of specialization are: 1) Geophysics, 2) Structural or Tectonic geology with some emphasis on geochemistry, geophysics, geomathematics or petroleum geology. It is anticipated that both positions will be filled at the level of Assistant Professor but applications for a more senior person will be considered. Degree of Ph.D. is required.

The Department awards BS, MS, and PhD degrees. The starting rank and salary depends on qualifications and experience—either industrial or academic.

Letters of application should include a full *curriculum vitae*, a statement of intent regarding research, names of three referees, and should be addressed to: Dr. Nicholas Rast, Chairman of Search Committee, Bowman Hall, Room 255, University of Kentucky, Lexington, KY 40506–0056, (606) 257-6222.

DEADLINE for application is *APRIL 15, 1984.*

The University of Kentucky is an affirmative action and equal opportunity institution.

Postdoctoral Fellowships in Geological Sciences or Geophysics. Each year Harvard University offers one or more postdoctoral research fellowships in geology or geophysics. Awards are for one year, normally renewable for a second year; stipends vary depending on the research field and the experience of the candidate, but $21,000 is typical. Interested applicants should send a resume and a statement of proposed research and arrange for at least two letters of reference to be sent to the Chairman, Department of Geological Sciences, Harvard University, Cambridge, Massachusetts 02138.

Deadline for the 1984–85 academic year is April 30, 1984.

Harvard University is an equal opportunity/affirmative action employer.

Postdoctoral Position/Experimental Spectroscopy. A postdoctoral position is available for a person with a Ph.D. degree in atmospheric physics. The position requires extensive efforts involving computer programming of sophisticated hardware featuring data acquisition. Knowledge and understanding of the behavior and operation of the Fabry-Perot interferometer are also required. The position requires field trips to remote sites where observations of airglow and aurora emissions are conducted. The successful applicant will also be expected to perform odelling calculations relating the physical principles to the measurements.

This is a full time position (40 hrs/week) with a salary of $20,500.00 per annum.

Interested persons should send a resume, names of three references, a statement of research interest, and any reprints if available, to:

7310 Woodward Avenue, Room 415
Detroit, MI 48202
(Reference 39683)
"Employer Paid Advertisement".

Research Associate. The Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, Colorado is advertising for a Research Associate position. The position description is as follows. The incumbent will initially participate as a member of a team of scientists in CIRES and NOAA involved in the development and calibration of two UV spectroradiometers for rocket-flight measurements of the solar UV spectral irradiance. This research is part of a program to determine the temporal variations of solar UV radiation, their stratospheric effects and possible effects on climate. The incumbent will participate in mountain-top measurements with the long-wavelength UV spectroradiometer to obtain direct intercomparisons at UV wavelengths with the mountain-top solar spectral irradiance measurements in the near UV, visible and infrared in collaboration with the University of Arizona. The incumbent will be resposible for the integration of the UV spectroradiometers into a rocket payload including developing the electronics interfaces with the sun-pointing system and the telemetry system. After the first rocket-flight measurements and depending on the experience of the incumbent, the incumbent's participation will range from a participating member of a team to being in charge of the follow-on rocket experiments, including the launch-site expeditions, recalibrations, and originating proposals to government agencies for rocket-flight and ground-station support.

The qualifications and desirable experience are as follows: a research scientist with a Ph.D. degree or equivalent in either physics, atmospheric science, astrophysics, meteorology, electrical or mechanical engineering with two years of research experience is required. Design and testing experience with electronics systems and microprocessors for use in the harsh environment of space, and for surviving the high-vibration environment of launch are required. Experience in vacuum UV spectroscopy, radiometry, rocket-flight, balloon-flight, shuttle-flight or satellite experiments or stratospheric research would be highly desirable. The salary range is $23,000—$30,000 depending on experience.

To apply for the position, applicants should submit a letter and complete resume including publications. In addition the applicant should request letters of recommendation from three individuals familiar with the applicant's personal and professional qualifications for the position. All application materials should be forwarded to: Dr. Robert E. Sievers, Director, CIRES, Campus Box 449, University of Colorado, Boulder, Colorado 80309. The closing date for applications is January 31, 1984.

The University of Colorado is an affirmative action/equal opportunity employer.

University of Oklahoma/Electronics Instrumentation Specialist. The School of Geology and Geophysics is accepting applications for a full-time Electronics Instrumentation Specialist. Principal responsibilities will include maintenance, calibration and user instruction for a new, computer-automated Rigaku XRD-XRF system, and maintenance and repair of electronic components of other lab facilities in the School. Additional opportunities could include involvement in the University's electron microscopy lab (SEM and TEM), and the development of a Van de Graaf-PIXE analytical system in collaboration with O.U. physicists. Applicants should have a B.S. in Geology, Chemistry, or Electrical Engineering or equivalent in experience; salary is commensurate with qualifications. Send curriculum vitae and names and addresses of three professional references to:

Dr. David London
School of Geology & Geophysics
University of Oklahoma
Norman, Oklahoma 73019

Deadline for applications is March 15, 1984.

The University of Oklahoma is an affirmative action/equal opportunity employer.

Space Plasma Theoretician/Princeton University. A postdoctoral position is available beginning summer of 1984 in the Theoretical Division of the Plasma Physics Laboratory, Princeton University, for one year with the possibility of renewal for a second year. Physicists with a Ph.D. degree or its equivalent or other relevant discipline are encouraged to apply. The position involves theoretical and numerical simulation studies on space plasma physics under the support of the National Science Foundation. Interaction with the members of the Laboratory engaged in fusion plasma physics is encouraged. Interested candidates should send a resume and three letters of recommendation to: Dr. H. Okuda, Plasma Physics Laboratory, Princeton University, Princeton, NJ 08544.

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Oceanography/FSU. Assistant Professor in Marine Chemistry or Biogeochemistry, Chemical Sedimentology or Atmospheric Geochemistry. Applications invited for position starting with 1984–85 academic year. Contact by 1 March 1984: Chemical Oceanography Search Committee, Department of Oceanography, Florida State University, Tallahassee, FL 32306, Telephone: 904-644-6705.

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ENDOWED PROFESSORSHIP IN NUMERICAL HYDROLOGY

The University of Alabama is pleased to announce the establishment of an Endowed Professorship in Numerical Hydrology in the Department of Civil Engineering. Nominations and applications are invited for this key position of leadership. The holder of the Professorship will be expected to provide leadership in research, graduate teaching and interchange of ideas with other departments and research entities on and off-campus. Applicants should have a doctoral degree in an appropriate area and must have demonstrated leadership abilities in the research areas of numerical and/or statistical methods as applied to such areas as typified by surface hydrology, groundwater hydrology, urban hydrology, river and coastal engineering, migration and dispersion of hazardous wastes, geothermal hydrology, real time hydrologic forecasting. Registration as a professional engineer is desirable. Nominations and applications with names and addresses of three references should be sent to:

Assistant Dean Gary C. April, College of Engineering
THE UNIVERSITY OF ALABAMA
P.O. Box 1968
University, Alabama 35486

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Applied Geophysics/Bolling Green State University. The Department of Geology invites application for a tenure track, assistant professor position in Applied Geophysics to begin September 1984. Ph.D. required. The successful candidate will be expected to develop a research program in some aspect of Applied Geophysics and teach courses in Geophysics, Exploration Geophysics and in his or her specialty.

The Department has eleven fulltime faculties. In addition, two faculties from the Physics Department participate in our geophysics program. Complete geophysical instrumentation, including a seismograph station and rock mechanics lab, is available.

Interested persons should send resume, statement of research interests, official transcripts, and three letters of reference to: Charles M. Onasch, Chairman, Search Committee, Department of Geology, Bolling Green State University, Bolling Green, OH 43403.

The closing date is March 15, 1984.

BGSU is an equal opportunity/affirmative action employer.

The University of New Mexico/Mass Spectrometry. The Department of Geology, University of New Mexico, Albuquerque, is seeking applicants for a Research Associate III position in the stable isotope laboratory. The position includes responsibility for operation and maintenance of mass spectrometers and high vacuum extraction systems, sample preparation and isotopic analyses. The position also provides opportunities for collaborative research in isotope geochemistry leading to publication. A Ph.D. in geochemistry, inorganic chemistry or physical chemistry with research experience involving mass spectrometry and high vacuum technology is required. Salary range is $16,000 to $24,000. Send a letter of application, resume, and the names and addresses of three individuals willing to serve as references to: Crayton J. Yapp, Department of Geology, University of New Mexico, Albuquerque, NM 87131. Closing date for applications is March 1, 1984.

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Transactions, American Geophysical Union

The Weekly Newspaper of Geophysics

For speediest treatment of contributions send three copies of the double-spaced manuscript to one of the editors named below and one copy to AGU.

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Cover. Gray-tone image of the geoid over the United States *(top)* and its two horizontal derivatives, the north *(middle)* and east *(bottom)* deflections of the vertical. Differentiation of the geoid enhances shorter wavelength undulations and creates an effect similar to the illumination of an irregular surface by a light source. Most of the geoid undulations reflect major tectonic features such as the Coast Range and Sierra Nevada in California, the Rocky Mountains in the western United States, and the Appalachian Mountains paralleling the eastern U.S. coast. Other geoid undulations such as the well-known midcontinent gravity high, which begins at Lake Superior and extends to the southwest, have no corresponding topography; instead they reflect stresses incurred during Precambrian tectonic activity. This midcontinent lineation is most apparent in the geoid *(top)*. The geoid was derived from gravity and astrogeodetic data. (Contributed by David Sandwell and Rudy Fury, National Geodetic Survey, National Oceanic and Atmospheric Administration, Rockville, MD 20852.)

Summer Assistantships/National Astronomy and Ionosphere Center. NAIC will be conducting a Summer Student Program at the Arecibo Observatory in Puerto Rico. Areas on interest are Atmospheric Science, Planetary Radar Astronomy, Radio Astronomy, Electronics and Computer Science. The assistantships are normally for ten weeks with the starting date being flexible. Graduate students and undergraduates who have completed at least three years of undergraduate training as of next summer are eligible. Travel costs to and from Puerto Rico will be paid by NAIC. Application forms, which must be submitted by February 1, 1984, are available from the Office of the Director, NAIC, Space Sciences Building, Cornell University, Ithaca, New York 14853.

Cornell University is an equal opportunity/affirmative action employer.

Faculty Position/University of Missouri—Rolla. An opening exists for a tenure track potential fields geophysicist in an established Geology and Geophysics Department. Applicants must have either a PhD or DSc degree in geophysics or in a closely related field. Competency in mathematics, geology, and computer applications is required. The successful applicant will be expected to develop and teach both undergraduate and graduate courses in potential fields methods especially as they apply to minerals exploration and the solution of engineering problems. Both the initial appointment of rank and salary are negotiable. All applications must be received by 1 May 1984. Successful applicant will be appointed in time for the Fall 1984 academic year.

Send applications or address inquiries to:

Chairman, Search Committee
Department of Geology and Geophysics
University of Missouri—Rolla
Rolla, MO 65401.

The University of Missouri—Rolla is an equal opportunity employer.

University of Georgia/12-month tenure-track faculty appointment in the School of Forest Resources. Qualifications: Ph.D in hydrology or forest hydrology with at least one degree in forest resources. Background should include forest resource management and quantitative sciences. Responsibilities: Teach undergraduate and graduate level courses in forest hydrology and watershed management. Develop a research program in an appropriate area of forest hydrology. Rank: Assistant or Associate Professor, commensurate with qualifications. Salary: Commensurate with training and experience. Position available: July, 1984. Applications: All applications must be postmarked no later than 1 February 1984. Submit resume, transcripts, and names of at least three references to:

Klaus Steinbeck, Chairman
Hydrologist Search Committee
School of Forest Resources
University of Georgia
Athens, GA 30602
Telephone 404-542-1376

The University of Georgia is an Equal Opportunity/Affirmative Action Institution.

University of Arizona/Postdoctoral Research Position in Planetary Atmospheres. Applications are invited for postdoctoral research positions at the Lunar and Planetary Laboratory, University of Arizona, in Tucson, Arizona. The two positions will involve research in planetary physics and analysis of UV data from the Voyager mission. Research opportunities for these positions include the bound and extended atmospheres and ionospheres of the giant planets and their satellites, the Io plasma torus, earth's atmospheres, the interstellar medium, and the atmosphere and ionosphere of Venus. Applicants should have a strong background in theory and data analysis. Physicists and astronomers are encouraged to apply. Curriculum Vitae, bibliography and three letters of reference should be sent by March 1, 1984 to Dr. A. L. Broadfoot, Lunar and Planetary Laboratory, University of Arizona, 3625 E. Ajo Way, Tucson, Arizona 85713

The University of Arizona is an Equal Opportunity Employer.

University of Arkansas/Tenure-Track Position—Structural Geology. Applications are invited for a tenure-track position in structural geology/tectonics, beginning August, 1984. The Ph.D. is required. Candidates who will strengthen our anticipated Ph.D. program with research interests in field-oriented studies of rock deformation, rock fabrics (or metamorphism), or the tectonics of active margins which would complement growing programs in geophysics, sedimentation, and petrology are encouraged to apply. The successful applicant will direct graduate research and maintain this program with outside funding as well as teach undergraduate and graduate courses in structural geology and tectonics, an occasional course in introductory geology, and provide some support for the Montana field camp. Rank and salary are open, depending upon experience and qualifications. Applicants should submit a resume and statement of teaching and research interests directly and arrange to have at least 3 letters of recommendation sent to Robert C. Morris, Department of Geology, University of Arkansas, Fayetteville, AR 72701. Phone 501-575-3355. Deadline for all material is March 31, 1984.

University of Arkansas is an equal-opportunity/affirmative action employer.

University of Iowa/Faculty Positions. The Department of Physics and Astronomy anticipates two openings for tenure-track assistant professors or visiting faculty at any level in August 1984. In exceptional cases a term or tenured appointment at the associate professor or professor level will be considered. Preference for one position will be given to an experimentalist in intermediate or high energy physics. Current research interests in the department are radio and optical astronomy and the following specialties in physics: atomic, condensed matter, elementary particle, laser, nuclear, plasma, and space physics. Faculty duties include undergraduate and graduate teaching, guidance of research students and personal research. Interested persons should submit a resume and a statement of research interests and arrange for three letters of recommendation to be sent to Search Committee, Department of Physics and Astronomy, The University of Iowa, Iowa City, IA 52242.

The University of Iowa is an equal opportunity/affirmative action employer.

Middlebury College/Sedimentary Geologist. The Department of Geology seeks a person with skills in sedimentary petrology, sedimentology, and/or stratigraphy, for a tenure track position. Appointment will be at the entry level and will begin September 1984. Letter of intent, resume, transcripts, and names of three referees should be sent, before March 1, 1984, to Brewster Baldwin, Chairman, Department of Geology, Middlebury College, Middlebury, VT 05753.

We are seeking an individual who is strongly research-oriented and who can complement the current petrology-tectonics interests of the department. The undergraduate program stresses field work and research. The curriculum is flexible and will be made compatible with the successful candidate's interests. The department has a fully automated electron microprobe, an XRF-XRD laboratory, and a vessel for studies on Lake Champlain.

Middlebury College is an equal opportunity employer.

Rijksuniversiteit Utrecht

University of Utrecht the Netherlands

In the faculty of Sciences, subfaculty of Geology and Geophysics, is, in the Department Geophysics of the Solid Earth, the vacant post of

PROFESSOR OF GEOPHYSICS (M/F)

His duties will concern:

- Teaching of subjects in geophysics of the solid earth, in compliance with the program of the department of Geophysics.
- Leading research to be carried out in agreement with the program of the Department.
- Participating in administrative and managerial tasks which are relevant to the Department.

Preference will be given to candidates with proven ability in the field of seismology.

The department of Geophysics of the Solid Earth, at present, comprises groups for Marine Geophysics, Paleomagnetism, Exploration Geophysics and Theoretical Geophysics (including Seismology).

The candidate is expected to give important and meaningful contributions to the further development of geophysics.

The salary scale is according to regulations between Dfl. 7378,- and Dfl. 9283,—per month.

Written applications, accompanied by a curriculum vitae and list of publications should be received before March 15, 1984, addressed to the Secretary of the Advisory Committee, Prof. Dr. N. J. Vlaar, Instituut voor Aardwetenschappen, Rijksuniversiteit Utrecht, Budapestlaan 4, 3584 CD Utrecht, the Netherlands under nl145.031

Persons who wish to draw the attention of the Committee to potential candidates are invited to express their opinion in writing to the Secretary of the Committee

CSIRO
POSTDOCTORAL RESEARCH FELLOWSHIP
$A24,344-$A30,038
DIVISION OF ENVIRONMENTAL MECHANICS CANBERRA ACT AUSTRALIA

FIELD: Physics of Soil Erosion by Wind and Water.

CSIRO conducts scientific and technological research in laboratories located throughout Australia and employs about 7,500 staff, of whom some 2,900 are professional scientists. The Organization's research activities are grouped into five Institutes: Animal and Food Sciences, Biological Resources, Energy and Earth Resources, Industrial Technology and Physical Sciences. The CSIRO Division of Environmental Mechanics is a member of the Institute of Physical Sciences.

Research in the Division of Environmental Mechanics is directed primarily at gaining a better understanding of the biological and physical processes of the soil-plant-atmosphere system with particular regard to the transport of energy, water, nutrients and other materials. Facilities include laboratories for soil physics, solar radiation, fluid mechanics, micrometeorology and physiology, as well as mobile laboratories for study of the field environment. The laboratory has a large and well instrumented boundary layer wind tunnel, and computer facilities for the collection and analysis of experimental data. The Division has a micrometeorology field site located 45 km from Canberra. Divisional staff at present includes 15 research scientists (biologists, physicists and mathematicians) together with experimental and technical staff, and is usually augmented by several visiting research workers.

The Division's research is being expanded to include a study of the problems of predicting and controlling erosion in the natural and agricultural environment. Applications are invited from suitably qualified persons to undertake theoretical and experimental investigations of the mechanisms involved in the movement of soil particles by wind and water. These investigations will interlock with work done by the Division on the relationship between rainfall intensity, soil physical properties and ponding; and work on the turbulence characteristics of air flows over rough and topographically variable terrain.

Applicants should have a PhD degree or equivalent, supported by evidence of proven research ability.

A fixed term appointment of three years within the classification of Research Scientist. An applicant with an outstanding research record may be offered appointment at a higher level. Australian Government superannuation benefits are available.

Applications stating full personal and professional details, the names of at least two scientific referees, and quoting No AO456 should be directed to:

The Chief
CSIRO Division of Environmental Mechanics
GPO Box 821
CANBERRA ACT 2601
AUSTRALIA
By February 29, 1984.

38631

Geophysics-Oregon State University. Applications are invited for a 12-month, tenure track position for an Assistant or Associate Professor of Geophysics in the College of Oceanography to complement the present eight member Geophysics faculty. The applicant must have a Ph.D. or equivalent, a demonstrated ability to conduct independent research in theoretical or observational geophysics, and to obtain research funding. Applicants will be considered in most areas of solid earth geophysics. Duties include teaching graduate courses in geophysics, supervising graduate students, and developing a program of grant funded research. Interested candidates should submit a resume, names of three references, and a brief statement of research plans by March 1, 1984, to: G. Ross Heath, Dean, College of Oceanography, Oregon State University, Corvallis, Oregon 97331.

Oregon State University, an affirmative action/equal opportunity employer, complies with section 504 of the Rehabilitation Act of 1973.

Planetary Geologist/Brown University. Tenure track Assistant to Associate Professor position starting July 1, 1984, or as soon as possible thereafter to teach and conduct research in planetary geologic processes on Earth and other planets. Research should be on understanding the physical processes (for example, impact cratering, volcanism, tectonism) responsible for the origin of planetary surfaces. Applicants must have Ph.D. in planetology, geophysics or geology. Deadline for applications is March 1, 1984. Interested parties should send vita and names of at least three persons we may contact for recommendations to: M.J. Rutherford, Chairman, Department of Geological Sciences, Brown University, Providence, RI 02912.

An equal opportunity/affirmative action employer.

Center for Ocean-Land-Atmosphere Interactions: Department of Meteorology, University of Maryland, College Park, MD The Department of Meteorology at the University of Maryland has established a center to study the interactions of ocean, atmosphee, and land processes and their impact on climate variability, and in particular to study the feasibility of dynamical prediction of short-term climate fluctuations. Applications are invited from qualified scientists to join the center at its inception. The center has the following openings:

1. *Assistant or Associate Professor:* One tenure track position for *Ocean Modelling.* The applicant should have good knowledge of oceanic and atmosphere dynamics, should also have the ability to develop ocean models and carry out research on variability and predictability of short term climate using coupled ocean-atmosphere models.

2. *Assistant or Associate Professor:* One tenure track position for *Atmospheric Predictability.* The applicant should have good knowledge of atmospheric dynamics and should have demonstrated his ability to carry out outstanding research on Geophysical Fluid Dynamics. Contributions to the study of atmospheric predictabiliy either using simple models or complex GCMS, would be considered desirable.

3. *Research Scientist:* One non-tenure faculty position to be supported fully by the grant funds. The applicant should have demonstrated excellent knowledge of atmospheric dynamics and general circulation of the atmosphere. Familiarity with the atmospheric GCMs is desirable but not essential.

4. *Assistant Research Scientist:* One non-tenure faculty position to be supported fully by the grant funds. The applicant should have demonstrated excellent knowledge of ground hydrology and interaction of vegetation and climate. Familiarity with application of land-surface process models in GCMs is desirable.

5. *Research Associate:* One position for one year with possibility of extension for the second year. The applicant should be a recent Ph.D. with interest in studying the dynamics of quasi-stationary atmospheric anomalies either by analysis of observed data or by analysis of model simulations.

6. *Faculty Research Assistants:* Three positions (two modelling and one for data analysis). The applicants should have at least M.S. in Meteorology and demonstrated their ability to work with large models and high speed computers. They should also have good understanding of synoptic and dynamic meteorology, and familiarity with modern techniques of processing large volumes of data.

Letters of application should be sent to:

J. Shukla, Chairman
Search Committee
Department of Meteorology
University of Maryland
College Park, MD 20742

Applications should include a curriculum vitae and names of three references. Applications received before March 15, 1984 will receive full consideration.

The University of Maryland subscribes to a policy of equal educational and employment opportunity. The University of Maryland, under Title IX of the Education Amendment of 1972, does not discriminate on the basis of sex in admission, treatment of students or employment.

Geophysicist Position/University of Colorado, Boulder. The Department of Geological Sciences, University of Colorado, Boulder, invites applications from geophysicists for appointment to a tenure track faculty position. Applicants' research interests should be in some aspects of crustal deformation, with emphasis on the use of modern geodetic techniques for the solution of geodynamics problems. The successful applicant will have opportunities for collaboration with strong research groups in the Cooperative Institute for Research in Environmental Sciences (CIRES) and the Joint Institute for Laboratory Astrophysics (JILA) of the University. This faculty member is expected to contribute to the undergraduate and graduate instructional programs by teaching courses in theoretical and/or applied geophysics, as well as assisting in the teaching of courses for non-science majors. The appointee is expected to maintain a vigorous research program, which will include the direction of graduate students in the geophysics program. Applicants must have received a Ph.D. degree and preference will be given to those with one or more years of productive post-doctoral experience. This position will be filled at the assistant professor level. The academic year salary range is $22,000 to $30,000.

The desired starting date is September 1, 1984. The closing date for applications is March 1, 1984. The application should include a complete curriculum vitae, with publication list and reprints of most important publications, and a statement of research and teaching interests. The applicant should arrange for four letters of reference to be sent directly to the Search Committee. Apply to: Geophysics Search Committee, Attention: Edith Ellis, Department of Geological Sciences, University of Colorado, Campus Box 250, Boulder, CO 80309.

The University of Colorado is an equal opportunity/affirmative action Section 504 employer.

Microprobe Technician-Operator/University of Maine at Orono. Subject to budgetary approval, the Department of Geological Sciences at UMO will have this position available by February 1, 1984. Person appointed must be capable of bringing an automated MAC 400S probe on line as a routine instrument; also able to instruct students on its operation. Similar capabilities with a mass spectrometer highly desirable. Some geologic background preferred. Initial appointment for one year with likelihood of subsequent reappointment. Salary in the range of $17,000-$20,000/year. Apply to: C.V. Guidotti, Department of Geological Sciences, University of Maine at Orono, Orono, Maine 04469.

The University of Maine is an equal opportunity/affirmative action employer.

SERVICES, SUPPLIES, COURSES, AND ANNOUNCEMENTS

THE ARCTIC SCIENCE PRIZE

The North Slope Borough is pleased to announce the establishment of The Arctic Science Prize. The Prize ($10,000) is to be given to distinguished scientists who have made significant contributions to man's understanding of natural processes in the Arctic. The purposes of the Prize are; to serve as recognition of the recipient's contributions, to further stimulate excellence in arctic science, and to focus attention upon the Arctic and its unique problems. An 11 member Candidate Review Committee will make the nominations and select the recipient.

The North Slope Borough is a local jurisdiction (county-like) that occupies most of the Alaskan Arctic. The Borough is very large (88,000 square miles) and sparsely populated (approximately 9,000 people).

Further information regarding the Arctic Science Prize can be obtained from:

Eugene Brower, Mayor
North Slope Borough
Box 69
Barrow, Alaska 99723

AGU

Membership Applications Received

Applications for membership have been received from the following individuals. The letter after the name denotes the proposed primary section affiliation.

Janet M. Aowsl (S), Everett F. Carter (O), Bernard M. Chapman (H), Richard Elliot (M), Robert Esull (S), Benjamin Gebhart (O), Ralph Haugerud (T), Jeremy K. Leggett (O), Joanne Miror (S), Terry L. Pavlis (T), Daniel Repeta (O), James F. Rychel (G), R. J. Sobey (O), Alan Swenson (T), David A. Trumm (V), Malcolm Weston (H).

Student Status

David G. Angle (O), Raphaele C. Bally (S), Clint D. Cagle (T), Robert B. Darragh (S), Linda Descano (T), Kurt Feigl (T), George J. Fischer (T), Pat Garces (S), Mary L. Garner (V), Steinar Thor Gudlaugsson (T), Randall Hay (T), David Hilton (V).

Mieczyslawa Klas (O), Stephen Lambert (S), Mark Ray Matthews (S), Karen K. Murphy (H), Liane M. Peterson (V), Thomas L. Pratt (S), Sarah Roeske (V), Richard L. Sedlock (T), Fernando M. Serra (SM), Eileen K. Stansbery (A).

Actions at Hamburg

International Association of Geomagnetism and Aeronomy

Resolutions

Reproduced below are resolutions adopted by IAGA during the 18th General Assembly of the International Union of Geodesy and Geophysics (IUGG) in Hamburg, August 15–27, 1983.

The resolutions passed at each quadrennial general assembly of IUGG and of its member associations are an important barometer of current opinion in the geophysics community and can be a powerful tool in the development of the scientific programs to which they are addressed. The resolutions will help advance programs, however, only if they are used. Carried back home by the national committees which make up the IUGG, the resolutions can spread information worldwide on programs that promise to most effectively advance geophysical knowledge. IUGG and its member associations intend that member groups will present the resolutions before deliberative bodies and otherwise use them to make decision makers aware of international scientific thought.

The 19 resolutions adopted by IUGG as a whole appeared in *Eos*, October 4, 1983, p. 582.

IAGA is deeply appreciative of the organization and efforts made by the Local Organizing Committee of IUGG, in particular it commends the excellent arrangement by the geomagnetism staff of the Deutsches Hydrographisches Institut to make our meeting effective and productive and to help make our stay in Hamburg pleasant and enjoyable.

1. IAGA welcomes the news that the World Data Center-C2 for Geomagnetism in Kyoto (Japan) has completed the derivation of the Auroral Electrojet (AE) Indices for the International Magnetospheric Study Years 1978, 1979, and the first half of 1980; congratulates those responsible for this fruitful and important work involving international cooperation, looking forward to the continuing cooperation of the WDC-C2 for Geomagnetism with the Japanese National Institute of Polar Research; and recommends strongly that observatories contributing the data for the AE-index do so in digital form as soon as is practical.

2. IAGA notes the scientific importance of interplanetary medium data and recommends that such data continue to be recorded for onward transmission to the World Data Centers.

3. IAGA commends the progress being made by the World Data Centers in developing computer-based techniques for data transmission and storage and urges the establishing of compatibility in both hardware and software, including the standardization of data formats.

4. IAGA recognizes that the quality of results from long time series depends on the accuracy and homogeneity of the data sets; notes that K indices from different networks of observatories have been used for many years in deriving planetary activity indices *Ap*, *Am*, and *Aa*, and that some observatories are now using digital recording systems and machine data reductions; and recommends (1) that routine derivation of K-indices continue by hand scaling according to the method proposed by Bartels (developed by Mayaud in IAGA Bulletin No. 21); and (2) that new, machine-derived indices be given distinctly different names to avoid confusion with existing indices.

5. IAGA recognizes the value of the MAGSAT global vector survey in defining the main magnetic field of 1980, the need for knowledge of the secular variation, its contribution to separating internal and external field variations, and the extreme usefulness of satellite observations of the magnetic field in delineating long-wavelength crustal anomalies and in producing magnetic charts; urges that another magnetic vector field satellite survey be carried out, most desirably at an altitude significantly lower than MAGSAT and preferably before 1990, and notes that a satellite such as the proposed Geopotential Research Mission of the USA would be excellent for the performance of these tasks.

6. IAGA will issue a revision of the International Geomagnetic Reference Field extending it from 1985 to 1990 and recognizing the crucial importance of recent data on secular variation for the accuracy of the revision, asks geomagnetic program directors to make an extraordinary effort to transmit their most recent data related to secular variation, including magnetic observatory mean values for 1983 and repeat survey results, to the World Data Centers before July 1, 1984.

7. IAGA appreciates the importance of long wavelength anomalies for the investigation of large-scale structures in the deeper parts of the Earth's crust and recommends the compilation of geomagnetic surveys of Europe and other regions in such a way as to allow the preparation of consistent anomaly maps.

8. IAGA notes the immense value to the scientific community of international programs for coordinated data acquisition, analysis and interpretation (e.g., IGY, IQSY, IMS, MAP, SMY) and recognizing the importance, complexity, and dynamic nature of the solar-terrestrial interaction, urges member nations to support and to participate in ICSU planning for international programs during the coming decade designed to acquire and to analyze widespread and well-coordinated data for quantitative investigations of the physical and chemical processes involved in the solar-terrestrial interaction.

Officers

Executive Committee

President: D. Ian Gough (Canada); *Vice Presidents:* Václav Bucha (Czechoslovakia), Roger Gendrin (France); *Secretary General:* Michael Gadsden (UK); *Members:* Naoshi Fukushima (Japan), Olav M. Raspopov (USSR), R. G. Rastogi (India), Ulrich Schmucker (FRG), Donald J. Williams (USA).

Division 1 Internal Magnetic Fields

Chairman: M. W. McElhinny (Australia); *Vice Chairmen:* M. Kono (Japan), R. A. Langel (UK), M. S. Zhdanov (USSR).

Working Group 1–1 Analysis of the Main Field and Secular Variations *Chairman:* D. R. Barraclough (UK); *Vice Chairman: W. Mundt (GDR).*

Working Group 1–2 Theory of Planetary Magnetic Fields and Geomagnetic Secular Variation *Chairman:* I. A. Eltayeb (Sudan); *Vice Chairman:* D. E. Loper (USA).

Working Group 1–3 Electromagnetic Induction and Electrical Conductivity (Earth and Moon) *Chairman:* B. A. Hobbs (UK); *Vice Chairman:* S. E. Hjelt (Finland).

Working Group 1–4 Magnetic Anomalies (Land and Sea) *Chairman:* P. J. Hood (Canada); *Vice Chairman:* W. J. Hinze (USA).

Working Group 1–5 Paleomagnetism *Chairman:* D. A. Valencio (Argentina); *Vice Chairman: C. E. Barton (USA).*

Working Group 1–6 Rock Magnetism Chairman: S. K. Banerjee (USA); *Vice Chairman: H. C. Soffel (FRG).*

Division 2 Aeronomic Phenomena

Chairman: M. H. Rees (USA); *Vice Chairmen:* A. Brekke (Norway), S. Kato (Japan), V. I. Moroz (USSR), C. A. Reddy (India).

Topic 2–1 Structure and Dynamics of the Thermosphere
Topic 2–2 Neutral and Ion Chemistry and Solar Fluxes
Topic 2–3 Atmospheric Quantal Emissions
Topic 2–4 Ionospheric Small Scale Structures
Topic 2–5 Ionosphere-Magnetosphere Interactions
Topic 2–6 Stratosphere-Mesosphere-Ionosphere Interactions
Topic 2–7 Aeronomy of Other Planetary Atmospheres
Topic 2–8 Laboratory Experiments of Aeronomic Interest
Topic 2–9 Planetary Exospheres

Note: All the reporters for the above topics will be nominated by the Division 2 Chairman.

Working Group 2-A Electrodynamics of the Middle Atmosphere *Chairman:* R. A. Goldberg (USA); *Vice Chairmen:* A. Brekke (Norway), H. Volland (FRG).

Working Group 2-B Ground Based Optical Interferometry Membership to be decided.

Division 3 Magnetospheric Phenomena

Chairman: A. Nishida (Japan); *Vice Chairman:* B. J. Fraser (Australia), D. J. Southwood (UK), C. U. Wagner (GDR).

Topic 3–1 Magnetosphere-Ionosphere Interactions *Reporter:* Y. Kamide (Japan); (Alternate) J. F. Fennel (USA).

Topic 3–2 Magnetosheath, Magnetospheric Boundary, and Plasma Penetration. *Reporter:* S. W. H. Cowley (UK); (Alternate) P. W. Daly (Netherlands).

Topic 3–3 Distribution and Properties of Magnetospheric Plasmas *Reporter:* D. T. Young (USA); (Alternate) H. R. Balsiger (Switzerland).

Topic 3–4 Energetic Particle Populations Including Cosmic Ray Entry *Reporter:* L. R. Lyons (USA); (Alternate) D. N. Baker (USA).

Topic 3–5 ULF Waves *Reporter:* A. D. M. Walker (South Africa); (Alternate) T. Saito (Japan).

Topic 3–6 Plasma Waves and Wave Particle Interactions *Reporter:* M. Ashour-Abdalla (USA); (Alternate) A. Roux (France).

Topic 3–7 Magnetic Storms and Substorms, Including Aurora-Magnetosphere Relations *Reporter:* W. Baumjohann (FRG); (Alternate) Y. Kamide (Japan).

Topic 3–8 Magnetospheres of Other Planets *Reporter:* S. D. Siscoe (USA); (Alternate) C. K. Goertz (USA).

Topic 3–9 Active Space Experiments, Laboratory Experiments and Computer Simulations *Reporter:* S. D. Shawhan (USA); (Alternate) J. Birn (USA).

Working Group 3–1 ULF Pulsations *Chairman:* W. J. Hughes (USA).

Working Group 3–2 Composition of Hot Magnetospheric Plasma *Cochairmen:* R. G. Johnson (USA), G. Haerendel (FRG).

Working Group 3–3 Quantitative Magnetospheric Models *Chairman:* W. P. Olson (USA).

Division 4 Solar Wind and Interplanetary Magnetic Field

Chairman: F. M. Neubauer (FRG); *Cochairmen:* T. K. Breus (USSR), T. Gombosi (Hungary), M. Neugebauer (USA), S. Pinter (Czechoslovakia).

Topic 4–1 Large Scale Characteristics of the Interplanetary Medium *Reporters:* A. J. Lazarus (USA), J. L. Steinberg (France).

Topic 4–2 Waves, Discontinuities and Turbulence in the Solar Wind *Reporters:* H. Goldstein (FRG), D. A. Gurnett (USA).

Topic 4–3 Solar Wind Interaction with Unmagnetized or Weakly Magnetized Bodies *Reporters:* M. K. Wallis (UK), T. Gombosi (Hungary), T. E. Cravens (USA).

Topic 4–4 Plasma Composition and Neutral Gases *Reporters:* H. J. Fahr (FRG), K. W. Ogilvie (USA), Dr. Gringauz (USSR).

Division 5 Observatories, Instruments, Indices and Data

Chairman: W. F. Stuart (UK); *Cochairmen.* S. L. Svendsen (USA), W. G. Elford (Australia), A. N. Zaitzev (USSR).

Working Group 5–1 Geomagnetic Observatories, Instruments and Standards *Chairman.* E. R. Niblett (Canada), *CoChairman.* A. J. Forbes (UK).

Working Group 5–2 Meteor and Partial Reflection *Chairman:* B. L. Kaschevev (USSR); *Cochairman:* W. G. Elford (Australia).

Working Group 5–3 Optical Calibration Standards *Chairmen:* H. L. Rauche (FRG), G. J. Kühn (South Africa).

Working Group 5–4 Magnetic Surveys and Charts *Chairman:* N. J. Skinner (Botswana); *Cochairman:* S. Utashiro (Japan).

Working Group 5–5 Geophysical Indices *Chairman:* M. Siebert (FRG); *Cochairman:* H. Maeda (Japan).

Working Group 5–6 Collection and Dissemination of Data *Chairman:* J. H. Allen (USA); *Cochairman:* E. R. Karin (USSR).

Working Group 5–7 Geomagnetic Repeat Stations *Chairman:* D. Voppel (FRG).

Ad Hoc Working Group on Geomagnetic Coordinate System *Chairman:* G. Gustafsson (Sweden)

Topic 5–1 Geophysical Alerts and Forecasts *Reporter:* J. Joselyn (USA).

IAGA representative to the MONSEE Steering Committee of SCOSTEP
J. H. Allen (USA).

Interdivisional Commission on Antarctic Research

Chairman: J. A. Gledhill (South Africa); *Cochairman:* A. N. Zaitzev (USSR); *Vice-Chairmen:* T. J. Rosenberg (USA), B. J. Fraser (Australia), H. Fukunishi (Japan).

Interdivisional Commission on History

Chairman: H. B. Garrett (USA); *Vice-Chairman:* S. R. C. Malin (UK), *Cochairmen:* J. Feynman (USA), W. Schroder (FRG).

Senior Executive Panel *Chairman:* E. J. Chernosky (USA).

Working Group on Development of Research *Chairman:* C. S. Gillmor (USA).

Interdivisional Commission on the Middle Atmosphere

Chairman: J. Taubenheim (GDR); *Cochairman:* P. C. Simon (Belgium).

Working Group on Irradiances Relevant to Aeronomic Processes in the Middle Atmosphere *Chairman:* P. C. Simon (Belgium).

Working Group on Aeronomic Processes of the Middle Atmosphere *Chairman:* G. Megie (France).

Working Group on Global Survey of Chemical Processes and Related Airglow Phenomena in the Middle Atmosphere *Chairman:* G. E. Thomas (USA).

Interdivisional Commission on External/Internal Geomagnetic Relations

Chairman. D. F. Winch (Australia); *Cochairmen:* S. Matsushita (USA), G. P. Gregori (Italy)

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Working Group on Passive Electromagnetic Probing of the Magnetosphere *Cochairman from IAGA Division 3:* A. J. Smith (UK), *Cochairman from URSI Commission H:* K. Tsuruda (Japan)

Working Group on Wave Instabilities in Space Plasmas *Cochairmen from IAGA:* S. I. Akasofu (USA), L. R. Lyons (USA), *Cochairmen from URSI:* E. J. Fremouw (USA), T. Sato (Japan)

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Meetings

Environmental Satellites

March 26–28, 1984 NOAA's Environmental Satellites Come of Age: Applications for Users and Opportunities for the Marketplace, Washington, D. C. Sponsor, National Environmental Satellite, Data, and Information Service. (SES, Inc., P.O. Box 2697, Springfield, VA 22152; telephone 800-424-2793, ext. 328).

Selected speakers from the public and private sectors will discuss environmental satellite products and services. The possible applications to data processing, aviation meteorology, marine meteorology, agriculture, forestry, wetland management, flood monitoring, utility forecasting and site location, search and rescue, hydrology, forensic meteorology, and the manufacture of hardware and software for environmental satellites will be covered. The speakers will also discuss new sensor applications and future products.

The Geophysical Year calendar last appeared in the December 6, 1983, issue.

Chapman Conference on The Magnetospheric Polar Cap

Call for Papers

A Chapman Conference on "The Magnetospheric Polar Cap" will be held in Fairbanks, Alaska, at the University of Alaska, Fairbanks Campus, August 6–9, 1984.

The purpose of the conference is to provide an opportunity for researchers to discuss various aspects of polar cap phenomena, the magnetotail, and effects of the interplanetary magnetic field. Polar cap phenomena include convection, ionospheric and field-aligned currents, particle precipitation, substorm effects, "polar cap" auroras and airglow, thermospheric and ionospheric winds, and ionospheric irregularities. Identification of the counterpoint phenomena in the magentotail is of great importance. We emphasize efforts in understanding how these phenomena are controlled by the solar wind and the interplanetary magnetic field. It is our hope that the conference will provide an opportunity to formulate coordinated projects in studying polar cap phenomena among the participants.

The magnetospheric polar cap, which is the highest latitude upper atmosphere bounded by the auroral oval, has attracted much attention during the last several years since the interactions between the solar wind (SW) and the magnetosphere-ionosphere (MI) system are manifested in various polar cap phenomena, and their understanding is crucial in elucidating basic plasma processes involved in the SW-MI interaction.

Format. The conference will consist of several invited review papers and other invited and contributed papers divided into eight sessions: Polar Cap Geometry, Polar Cap Electrodynamics, Plasmas (2 sessions), Theoretical Problems, Polar Cap Auroras, Polar Cap Ionosphere, and Polar Cap Thermosphere.

All interested in attending and in receiving later information circulars should write to Magnetospheric Polar Cap Meeting, AGU, 2000 Florida Avenue, N.W., Washington, DC 20009, telephone 202-462-6903 or toll free at 800-424-2488.

Deadline for submitting abstracts: May 1, 1984. To submit an abstract, follow the abstract format published in *Eos*, November 15, 1983, p. 937. There will be no abstract charge. All abstracts should be submitted to the convenors, S.-I Akasofu and J. R. Kan, Geophysical Institute, University of Alaska, Fairbanks, Alaska 99701.

Formal notification will be sent about 1 month after the abstract deadline. Because of the anticipated demand, papers will be selected based on their relevance to the general conference outline.

Program Committee. Nancy Crooker, UCLA; Lou Frank, University of Iowa; Mike Kelley, Cornell University; Andy Nagy, University of Michigan; Rita Sagalyn, Air Force Geophysics Laboratory; Bob Schunk, Utah State University; Dick Wolf, Rice University.

Student Travel. Limited funding is available to support student travel expenses to the conference. To apply, write to AGU giving your educational background, your reasons for wanting to attend the conference, and your research interests. The awardees will be selected by AGU in conjunction with the program committee. Deadline for travel applications is March 30, 1984.

Special Sessions at the 1984 AGU Spring Meeting

The following topics are among the special sessions to be held at the 1984 AGU Spring Meeting, May 14–19, 1984, in Cincinnati, Ohio. The call for papers and sample abstracts were published in *Eos*, November 15, 1983, p. 937, and January 10, 1984, pp. 14–15. A list of special-session titles appeared in the January 10 issue, p. 15.

The deadline for receipt of abstracts is 5 P.M., February 22.

Geodesy

Trends in Geodesy

A session on Trends in Geodesy will focus on areas in which important new results are expected in the next decade. There will be a number of brief, invited comments on different areas by members of a panel, followed by discussion and comments from the audience and the panel. Topics to be discussed include improvements in surveying methods; geodetic programs in developing countries; crustal movement monitoring in seismic zones; worldwide measurements of present tectonic plate motions; gravity and magnetic field measurements; and satellite altimetry.

Development and Application of Global and Regional Geodetic Datums

Subjects to be considered in this session include methods of adjustment of large geodetic networks; combination of diverse data types; choice of reference system for a network; accuracy evaluation; and application to geodynamics. This session is especially relevant to the current adjustments of North America horizontal and vertical datums.

Interdisciplinary Research in Geodesy and Tectonophysics

The highly accurate and extensive data provided by the Seasat and GEOS III satellite altimetry have provided a unique opportunity for interdisciplinary research in geodesy and tectonophysics. Some of the areas to be discussed include the relationship between bathymetry and the gravity field, description of the thermal and mechanical properties of the oceanic lithosphere and upper mantle, mechanisms of isostatic compensation, detection and analysis of fracture zones and seamounts, and studies of the dynamics of subduction zones and spreading centers.

Excitations of the Earth's Rotation

This session will be a forum for interdisciplinary research in the excitation of the earth's rotation and will focus on the contributions from various sources such as the atmosphere, oceans, mantle, and core. Topics may include measurements and interpretation of time, length of day, polar motion and atmospheric angular momentum.

Geomagnetism and Paleomagnetism

Irregularities in the Secular Variation (Main Magnetic Field) and Geodynamic Implications (Cosponsored by G)

We are inviting contributors to this session to prepare written manuscripts of their talks for publication in a special volume of a scientific journal. Those not planning to attend the Spring AGU Meeting are invited to submit contributed papers to this special journal volume. Exact details as to deadlines and format have not beeen settled; the G&P section chairman (Patrick T. Taylor, Code 922,

Meetings (cont. on p. 30)

Meetings (cont. from p. 29)

(cont. from p. 29)

NASA/GSFC, Greenbelt, MD 20771) will supply information on an interim basis.

Hydrology

Geochemistry/Water Quality of Catchments

A half-day session dealing with catchment hydrogeochemistry will be convened under the joint sponsorship of the Volcanology, Geochemistry, and Petrology and Hydrology sections. The meeting will focus on the quantification of the hydrogeochemical response of catchments as inferred from field research, monitoring programs, and theoretical calculations. Particular attention will be given to the problem of extrapolation of results from laboratory and small-scale field experiments on weathering reactions, soil formation, and cation exchange processes to the catchment scale in the face of the large spatial variability associated with both hydrological and chemical processes.

Abstracts should be submitted in standard AGU format to one of the session cochairmen, Owen Bricker, USGS National Center, 12201 Sunrise Valley Dr., Reston, VA 22070 or George Hornberger, Department of Environmental Sciences, Clark Hall, University of Virginia, Charlottesville, VA 22903, by February 15. Please note that the original and two copies of the abstract should be sent to AGU by the February 22 abstract deadline.

Hillslope Hydrology

The Surface Runoff Committee of AGU's Hydrology Section is preparing a one day session on Hillslope Hydrology, to be held at the 1984 Spring Meeting in Cincinnati. Eight speakers have already accepted an invitation to contribute their latest ideas and results. Topics that will be presented include variable source area concepts, reactions of the saturated zone upon infiltration, kinematic wave approximations to the hillslope flow processes, water budget models, and comparisons of various rainfall-runoff models.

If you plan to present a paper at this session, please send a copy of the abstract you are going to submit to AGU headquarters, no later than February 1, to Peter Germann, Department of Environmental Science, Clark Hall, University of Virginia, Charlottesville, VA 22903, 804-924-0558.

Ocean Sciences

Ocean Drilling: Past and Future

Over the past 15 years, the *Glomar Challenger* has drilled at 624 sites throughout the world ocean and has contributed to major advances in our understanding of global tectonics, the evolution of continental margins and paleoenvironments, and the nature of oceanic crust. Fundamental geoscience questions have been both answered and generated, and hundreds of scientists from dozens of countries have contributed to the results of this remarkable project. At this juncture, between the conclusion of the Deep Sea Drilling Project and the initiation of the Ocean Drilling Program, it is appropriate that we assess the implications of scientific ocean drilling and focus on the opportunities afforded by future drilling from a vessel of enhanced capabilities.

Response of the Upper Ocean to Very Strong Wind II

The session is intended to be a follow-up to a similar special session held at the 1983 AGU Fall Meeting. Topics of interest for this session include tropical or mid-latitude storm forcing of upwelling, mixing and internal wave processes in the upper ocean as well as studies of thermodynamic or kinetic energy budgets related to such processes. Both theoretical and observational studies are encouraged. Convenor for the session will be Peter G. Black, NOAA, Atlantic Oceanographic and Meteorological Laboratory, Miami, Florida.

SPR: Cosmic Rays

New Techniques and Applications of Geomagnetic Effects in Cosmic Ray Studies (Cosponsored by GP)

Recent improvements in cosmic ray detection from balloons and satellites, in geomagnetic field measurements from satellites, and in accurate high-speed computation have enormously improved the accuracy and availability of cosmic ray trajectory calculations. These developments and their application to studies of primary cosmic ray isotopes, cosmic-ray-disturbed time variations, nuclides produced by cosmic rays in the atmosphere, and to studies of geomagnetism will be reviewed. Contributed papers are encouraged.

New Observations and Theories in Solar Flare Particle Acceleration (Cosponsored by SS)

This session features invited and contributed papers on recently discovered aspects of the production of energetic ions and electrons in solar flares.

Displays of Energetic Solar Phenomena (Poster Session) (Cosponsored by SS)

This session is for display of material related to special sessions on flare particle acceleration and on present and future solar missions.

GAP

Separates

To Order: The order number can be found at the end of each abstract; use all digits when ordering. Only papers with order numbers are available from AGU. ***Cost:*** $3.50 for the first article and $1.00 for each additional article in the same order. Payment must accompany order. Deposit accounts available.

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Meteorology

[illegible]

... distribution of the aerosol which formed in the stratosphere during the first 15 months following the volcanic eruption of El Chichón. The latter appears to have reached a peak in [illegible] in early 1983 and began a decline in [illegible]. Measurements of average aerosol radius were also used to estimate a stratospheric concentration of about $10^{?}$ cm^{-3} 40 days after the eruption and a [illegible] lifetime of [illegible] days in the 18–25 km altitude region. (Stratospheric aerosols, volcanic aerosols). [illegible] Paper [illegible]

Oceanography

1755 General (Oceanic Wind Measurement)
ACOUSTIC MEASUREMENTS OF WIND SPEED AND PRECIPITATION OVER A CONTINENTAL SHELF
D.M. Lemon (Arctic Sciences Ltd., 1986 Mills Rd., R.R.2, Sidney, B.C., V8L 3S1), D.M. Farmer and D.R. Watts

During the summer of 1982 at sites on the continental shelf of British Columbia, ambient noise measurements were made in three frequency bands centred at 4.3, 9.0 and 14.5 kHz. The experiment was designed to compare the relationship between ambient noise and wind speed over a continental shelf, with similar previous measurements made in the deep ocean. Ambient noise and simultaneous surface wind speed observations at two locations were consistent with the previously-determined relationship

$$20\log V = a(NSL) - b$$

where V is the surface wind speed at 3 m in m s^{-1}, NSL is the observed noise spectrum level in dB re 1 μPa/Hz$^{1/2}$ and a and b are frequency-dependent constants. The resulting coefficients are similar to those found previously and allow a fit between ambient noise and wind speed to within ±1.5 m s^{-1} over the observed range of 0–12 m s^{-1}. Although the data are relatively sparse, a clear acoustic signal associated with precipitation was observed and compared with rainfall measurements made at nearby coastal light stations. Using Franz's [1959] theoretically-determined calibration, the results show good agreement with the presence or absence of rain and agreement to within a factor of 2 in the measured quantity. The results provide encouraging evidence for the potential use of ambient noise measurements in estimating both wind speed and precipitation. (Ambient noise, wind speed measurements).
J. Geophys. Res., Oceans, Paper 3C1989

Particles and Fields—Ionosphere

5520 Ionospheric electric fields
A MECHANISM FOR THE WESTWARD TRAVELING SURGE DURING SUBSTORMS
J. R. Kan, (Geophysical Institute, University of Alaska, Fairbanks, Alaska, 99701), R. L. Williams and S.-I. Akasofu

It is proposed that the westward traveling surge is formed as a result of a partial blockage of the substorm-enhanced Hall current from closure in the magnetosphere. The partial blockage of the enhanced Hall current leads to a buildup of "excess" charge in the ionosphere which in turn produces a polarization electric field. We show that the resulting ionospheric electric field exhibits the characteristic distortion of the convection pattern associated with substorms. The distortion of the convection streamlines intrudes westward; the westward traveling surge is an optical manifestation of this intrusion. The speed of the westward traveling surge is identified with the speed of the charge spread which depends on the time rate of change of the Hall current blockage and the propagation of charges across field lines via electrostatic ion acoustic waves in the ionosphere.
J. Geophys. Res., Space, Paper 3A1840

5520 Electric Fields
THE PRODUCTION OF ION CONICS BY OBLIQUE DOUBLE LAYERS
Joseph E. Borovsky (Space Plasma Group D-438, Los Alamos National Laboratory, Los Alamos, New Mexico, 87545)

Magnetized test ions are subjected to acceleration through a numerically simulated oblique double layer in order to determine whether they emerge with velocity vectors aligned with or oblique to the ambient magnetic field. A criterion for oblique alignment, depending on the double-layer parameters and on the external magnetization, is obtained. When applied to observed and theoretical auroral double layers, this criterion predicts that accelerated heavy ions will be substantially less magnetic-field aligned than will accelerated hydrogen ions, thus suggesting auroral double layers as a source of high-energy ion conics. Test-particle simulations are also used to investigate the perpendicular heating of ions at low altitudes by the electric fields associated with moving auroral arcs. The rapid motion of small-scale structures in the arcs is suggested as a source of low-energy conical ion distributions and the slow drifts of the entire arc forms are inferred to heat ionospheric ions. (Conics, numerical simulation, double layers, curls).
J. Geophys. Res., Space, Paper 3A1968

5535 Interactions between waves and particles
TURBULENT HEATING OF HEAVY IONS ON AURORAL FIELD LINES
M. Ashour-Abdalla (Institute of Geophysics and Planetary Physics and Department of Physics, University of California, Los Angeles, CA 90024) and H. Okuda (Plasma Physics Laboratory, Princeton University, Princeton, NJ 08544)

Electrostatic ion cyclotron turbulence and the associated acceleration of ions on auroral field lines are investigated analytically and by plasma simulations. The auroral plasma is assumed to consist of drifting electrons and stationary hydrogen and oxygen ions. It is found that for a given critical drift, the maximum ion perpendicular heating is generally larger for oxygen ions than for hydrogen ions. Simulation results show that unless the oxygen ions are a minority species, oxygen transverse heating generally exceeds that of hydrogen ions. Theory and numerical simulations are in good agreement. (Particle acceleration, ion conics, auroral field lines).
J. Geophys. Res., A, Paper 4A0008

5535 Interactions between waves and particles
WHISTLERS EXCITED BY A PLASMA JET.
J. Thiel (LPCE, Université d'Orléans, 45046 Orléans Cédex, France), L.R.O. Storey, U.R. Bauer and D. Jones.

Aboard the Porcupine rockets, bursts of noise were detected in the electron whistler range during the operation of a xenon plasma gun on a package ejected from the main payload. The gun produced a neutralized 200 eV ion flux of about 2.5 10^{19} ion/s and the waves were detected by a medium frequency probe consisted of a field-aligned electric dipole antenna formed by two spheres separated by 1.6 m. During the first xenon event, for which the distance between the main payload and the gun increased from 4.5 to 80 m, intense bursts of wide-band noise are apparent on the spectrograms, then, a narrow spectral peak is distinguishable. The other events were accompanied by narrow-band noise, the central frequencies of which varied from one events to the next. The observations can be interpreted in terms of excitation of the lower oblique resonance by instabilities associated with the motion of the xenon ion beam through the ionospheric plasma.
J. Geophys. Res., A, Paper 3A1893

5545 Ionospheric disturbances
MULTI-FREQUENCY STUDY OF IONOSPHERIC SCINTILLATION AT ASCENSION ISLAND
S. J. Franke (University of Illinois at Urbana-Champaign, Urbana, Illinois, 61801), C. H. Liu and D. J. Fang

Multifrequency amplitude scintillation data at L and C bands from the equatorial region at Ascension Island are used to study the spectral index n for the scintillation index S_4. The average frequency dependence of the scintillation index (S_4) is found to be $f^{-1.66}$. It is shown that the spectral index tends to be larger for events which occur after 2030 local time than for events which occur before 2030. This may indicate temporal evolution of the irregularity spectrum. Model studies based on a two component power law irregularity spectrum are applied to relate changes in n to spectral evolution and to show that the observations are consistent with recent in-situ measurements. Possible geophysical implications are also discussed. (Scintillation, plasma bubbles).
Rad. Sci., Paper 3S1939

5545 Ionospheric Disturbances
COMPOSITE EQUATORIAL SPREAD-F WAVENUMBER SPECTRA FROM MEDIUM TO SHORT WAVELENGTHS
M. Singh and E. P. Szuszczewicz (Naval Research Laboratory, Code 4108, Washington, D. C. 20375)

In an effort to provide a full-spectral classification of equatorial spread-F irregularities from large scale behavior (≈ 100 km) to the meter-size domain, we have analyzed a combination of rocket and satellite data which in concert cover the complex six decade irregularity distribution. Our results provide a composite perspective in the hierarchy of processes which contribute to the total phenomenon called equatorial spread-F and provide the first "in situ" meter-size irregularity measurements which help explain the relationship of spectral power at short wavelengths to that in the transitional and intermediate domain. In a synoptic perspective we find that medium and intermediate wavelength domains (≈ 50 km → 20 m) display $k^{-1.5\pm0.4}$ and $k^{-2.4\pm0.2}$ behaviors respectively, in both vertical and horizontal distributions. The transitional wavelengths (≈ 200 m → 20 m) are dominated by a steep one-dimensional $k^{-4.8\pm0.2}$ universal-drift-wave spectral behavior but break at $k r_i \gtrsim 1$ ($\lambda \lesssim 20$ m) to much higher power levels...a result which is consistent with ground based radar results in the meter-scale domain. Our shortest wavelength rocket results (1 m ≲ λ ≲ 20 m) are qualitatively consistent with a lower-hybrid-drift wave interpretation but the presence of resonant structure in the observed spectral distribution strongly suggests a resonant wave-particle-interaction process.
J. Geophys. Res., Space, Paper 3A1945

5563 Plasma motion, convection, or circulation
PARTICLE ACCELERATION PARALLEL AND PERPENDICULAR TO THE MAGNETIC FIELD OBSERVED BY DE-2
R. A. Heelis (Space Sciences, Physics, UT Dallas, Richardson, TX 75083), J. D. Winningham, M. Sugiura, and N. C. Maynard

Observations by the instrument payload on DE-2 have been used to study the plasma and electrodynamic properties of the ionosphere when field-aligned currents approaching 100 μA m^{-2} flow at about 900 km altitude. In such a situation it is found that the thermal ions may account for a substantial fraction of the current carriers and that the bulk of the energetic electron population has undergone a net acceleration of a few hundred eV. Large amplitude electrostatic waves that have a maximum near 100 Hz and an energetic ion population that shows evidence for both parallel and perpendicular acceleration to about 30 eV also accompany such events. The horizontal thermal ion drift (electric field) that accompanies these plasma phenomena has extremely large gradients over small spatial scales. Such a signature is consistent with a requirement for a large field-aligned current and a limit to the available field-aligned potential difference that may be applied to the plasma.
J. Geophys. Res., A, Paper 3A1984

5570 Total Electron Content
THE STUDY OF THE EFFECT OF SOLAR ECLIPSES ON THE IONOSPHERE BASED ON SATELLITE BEACON OBSERVATIONS
Elizabeth A. Cohen (Physics Department, La Trobe University, Bundoora, Victoria 3083, Australia).

Satellite beacon observations during eclipses have provided much information on the behaviour of the ionosphere. A combination of Faraday rotation and differential phase measurements as well as ionosonde data can provide information on the topside and bottomside ionospheric behaviour during an eclipse as well as on the production rate. Recent attention has been directed towards a study of the dynamics of the F region during an eclipse and the relation between the amount of depletion in the total electron content and the per cent obscuration of the sun. Of particular interest is the time delay from the maximum obscuration to the maximum depletion of the total electron content. Further modelling studies are required in order to reproduce the experimental results.

Further observations are also required in order to establish whether TIDs are generated following a total solar eclipse as predicted theoretically. In particular it appears that a more sensitive technique such as differential Doppler rather than Faraday rotation is required. The total solar eclipse of 11 June 1983 with its long totality time of 4-5 minutes over Indonesia and Papua New Guinea will provide an ideal opportunity for further studies of these unanswered questions.
Rad. Sci., Paper 3S1995

5580 Wave propagation
DIRECT ACCESS TO PLASMA RESONANCE IN IONOSPHERIC RADIO EXPERIMENTS.
E. Mjølhus (IMR, University of Tromsø, 9001 Tromsø), T. Flå.

The concept of linear conversion of radio waves into electrostatic waves is adapted to ionospheric radio heating experiments. It is identified as access to the plasma resonance through the radio window. By means of existing heating facilities large concentrations of electrostatic (e.s.) wave energy can be generated. The e.s. waves are confined to a restricted region in space, horizontally displaced relative to the vertical over the heating transmitter along the magnetic meridian; the displacement being southwards on the northern hemisphere. Ray tracing studies of the location of the resonance region relative to the transmitter are presented, and the horizontal dimension is estimated.
J. Geophys. Res., Space, Paper 3A1974

5590 Instruments and techniques
COMPARISON OF NAVSTAR SATELLITE L-BAND IONOSPHERIC CALIBRATIONS WITH FARADAY-ROTATION MEASUREMENTS
H. N. Royden (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California 91109), R. B. Miller, and L. A. Buennagel

Using the Faraday-rotation technique, the Deep Space Network of the Jet Propulsion Laboratory (JPL) monitors ionospheric total electron content (TEC) at its three complexes at Goldstone, California, Canberra, Australia, and Madrid, Spain, to correct data used in the orbit-determination process for ionospheric effects. With the number of earth satellites suitable for Faraday-rotation measurements steadily decreasing, JPL is investigating other ways to determine ionospheric TEC. One promising method has been developed by MacDoran and Spitzmesser. This method exploits the coherent P-code modulation of the two L-band signals (1575.42 and 1227.60 MHz) transmitted by satellites of the NAVSTAR Global Positioning System (GPS), but does not require knowledge of the code. It has been named SLIC, for Satellite L-band Ionospheric Calibration. With the full complement of 18 GPS satellites in operation in 1987, continuous ionospheric sampling in at least four directions will be feasible with SLIC. In this paper, TEC data measured at Goldstone using SLIC are compared with the results of mapping Goldstone Faraday TEC to the five GPS satellite lines of sight. The results of the two methods are in reasonable agreement. (Faraday rotation, GPS, ionospheric total electron content, NAVSTAR).
Rad. Sci., Paper 3S1949

5599 General
FURTHER STUDIES OF AURORAL ROAR
Paul J. Kellogg (School of Physics and Astronomy, University of Minnesota, 116 Church St. S.E., Minneapolis, Minnesota, 55455), Steven J. Monson

Extended observations of auroral roar, a weak radio emission near the second harmonic of the electron cyclotron frequency, are reported. A total of 60 events were recorded and analyzed. Data for frequency band, duration, and local time of occurrence are presented. The height of the generation region is estimated to be 275–575 km. (Radio emissions, aurora).
Rad. Sci., Paper 3S1435

Particles and Fields—Magnetosphere

5705 (Bow Shock Waves)
THE STRUCTURE OF OBLIQUE SUBCRITICAL BOW SHOCKS: ISEE 1 AND 2 OBSERVATIONS
M. M. Mellott (Institute of Geophysics and Planetary Physics, University of California, Los Angeles, CA 90024), E. W. Greenstadt

We have studied the structural elements, including shock ramps and precursor wave trains, of a series of oblique low Mach number terrestrial bow shocks. We used magnetic field data from the dual ISEE 1 and 2 spacecraft to determine the scale lengths of various elements of shock structure as well as wave lengths and wave polarizations. Bow shock structure under these conditions is essentially that of a large amplitude damped whistler mode wave which extends upstream in the form of a precursor wave train. Shock thicknesses, which are determined by the dispersive properties of the ambient plasma, are too broad to support current-driven electrostatic waves, ruling out such turbulence as the source of dissipation in these shocks. Dissipative processes are reflected in the damping of the precursors and dissipative scale lengths are ~ 200 - 800 km (several times greater than shock thicknesses). Precursor damping is not related to shock normal angle or Mach number, but is correlated with Te/Ti. The source of the dissipation in the shocks does not appear to be wave-wave decay of the whistlers, for which no evidence is found. We cannot rule out the possibility of contributions to the dissipation from ion acoustic and/or lower hybrid mode turbulence, but interaction of the whistler itself with upstream electrons offers a simpler and more self-consistent explanation for the observed wave train damping.
J. Geophys. Res., A, Paper 3A1988

5720
A CLOSE LOOK AT THE SOLAR WIND-MAGNETOSPHERE
L. Rossberg (Max-Planck-Institut für Aeronomie 3411 Katlenburg-Lindau, Germany

A study of the short term (12 hours) variation of the linear correlation between the solar wind-magnetosphere energy coupling function ε and the electrojet index AE revealed unexpected strong variations of the correlation coefficient R and of the ratio between ε and AE. About half of all R-values fell below the 95% confidence level and the ratio between ε and AE varied by more than 100% of the average value. This result reveals that the ε-function is not a very good predictor of substorms and their intensities. Several possible causes for the variations are discussed. It is shown that some of the variations of the correlation coefficient occur on account of a variable temporal relationship between ε and AE. (Interaction, magnetosphere, solar wind, substorms).
J. Geophys. Res., Space, Paper 3A1976

5730 Magnetic tail
THE SHAPE AND POSITION OF THE PLASMA SHEET IN EARTH'S MAGNETOTAIL
G.-H. Voigt (Dept. of Space Physics and Astronomy, Rice University, Houston, Texas, 77251)

The configuration of the tail plasma sheet in earth's magnetotail has been calculated in connection with a three-dimensional magnetospheric B-field model. This model is based on the idea that thermal plasma, tail currents, and magnetic field be in magneto-hydrostatic equilibrium during time periods of magnetically quiet conditions. The tail configuration is generated by a separation method assuming a cylindrical magnetotail boundary with constant radius. The separation method restricts self-consistency to planes perpendicular to the tail axis. The computed tail plasma sheet is flexible and reacts to changes of the earth's dipole tilt angle and changes of the solar wind pressure. Consequences for the plasma sheet configuration with respect to the assumed tail magnetopause shape and the separation method are the following: (1) the plasma sheet thickness increases in Y_{GSM}-direction toward the flanks of the tail; (2) the plasma sheet becomes thicker and more diffuse with increasing distance from the earth; (3) during the northern hemisphere summer, the neutral sheet is raised above the magnetospheric equatorial plane around local midnight, but crosses this plane and is depressed below it near the flanks of the tail. The latter result agrees qualitatively with Fairfield's empirical neutral sheet model which he derived from spacecraft measurements of the tail field polarity. This agreement between theory and observational material provides a further piece of evidence that the magneto-hydrostatic theory is an appropriate level for describing quantitatively the quiet state of the magnetosphere. (Hydromagnetic equilibrium, magnetospheric configuration).
J. Geophys. Res., A, Paper 4A0037

5755 Plasma instabilities
DIRECT GENERATION OF THE AURORAL KILOMETRIC RADIATION BY THE MASER SYNCHROTRON INSTABILITY. PHYSICAL MECHANISM AND PARAMETRIC STUDY
D. Le Quéau (Centre de Physique Théorique, Ecole Polytechnique, 91128 Palaiseau-Cedex, France), R. Pellat and A. Roux.

Recent observations at low altitudes made in the source region of the Auroral Kilometric Radiation (AKR hereafter) strongly support the Maser Synchrotron Instability (MSI) as the relevant generation process for the AKR. This was first realized by Wu and Lee [1979]. In a recent work, Le Quéau et al [1983] have proposed an analytical treatment of the MSI. The present work is a continuation of this analytical study. We first investigate the physical process of the MSI, and simple analytical expressions, valid for any distribution functions of nonthermal electrons, are given. It is shown that supraluminous X-mode waves ($\omega/k_\parallel c \gg 1$) can resonate with relatively low energy electrons, provided that the cold plasma parameter ω_p^2/ω_c^2 is much smaller than unity. The proper frame of reference for studying the resonant coupling between the X mode and nonthermal electrons moves at a parallel velocity $k_\parallel c^2/\omega$. Resonance curves are then circles centered around this value and electrons diffuse with almost constant parallel velocities. The difference between the MSI and the standard cyclotron theory (where resonance curves are straight lines, and diffusion curves are circles centered around $\omega/k_\parallel$) is stressed. A parametric study of the instability conditions for such a supraluminous wave is conducted. We investigate the role played by Θ, the propagation angle, ε_p, the normalized density of energetic electrons, δ, the energy width of the part of the distribution function where an inversion of population ($\partial f/\partial v_\perp > 0$) occurs, and finally u, the parallel velocity which characterizes the maximum of $\partial f/\partial v_\perp$ integrated along a resonance circle. In the case of the shifted loss cone distribution used here, u is simply its parallel bulk velocity. Largest growth rates are obtained for $k_\parallel c^2/\omega \approx u$.
J. Geophys. Res., Space, Paper 3A1759

5755 Plasma Instabilities
A SIMPLE EXPRESSION FOR KILOMETRIC RADIATION GROWTH RATES AND ANALYTICAL APPLICATIONS
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A simple expression is derived for the linear growth rate of R-X mode, auroral kilometric radiation under the assumptions of cold plasma wave dispersion and $\omega_{pe}^2 \ll \Omega_e^2$, where ω_{pe} and Ω_e are the electron plasma frequency and gyrofrequency, respectively. The result is valid for all wave normal angles and all frequencies above the right-hand cutoff frequency. With this expression, it is not necessary to evaluate the full dispersion tensor, and variations of the growth rate with plasma parameters are easily obtained. Corrections to a previously employed, equivalently simple expression for the growth rate are also easily obtained, the previous expression being valid only for nearly perpendicular wave propagation and frequencies well above the cutoff. Applying the new expression, we find that kilometric radiation growth rates Y are strongly dependent upon the magnitude of the magnetic field-aligned potential difference $V_\parallel$, with $Y \propto V_\parallel$, and that significant growth of radiation at harmonics of the fundamental is unlikely in regions where $\omega_{pe}^2 \ll \Omega_e^2$.
J. Geophys. Res., Space, Paper 3A1799

5755 (Plasma instabilities)
ACCELERATION OF THERMAL ELECTRONS BY ICW'S PROPAGATING IN A MULTICOMPONENT MAGNETOSPHERIC PLASMA
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Norris et al. [1983] have recently shown that thermal (~ 1 eV) electrons are accelerated along field lines (up to tens of eV) when intense Ion Cyclotron Waves (ICW's) are simultaneously present in the equatorial magnetosphere. In the present paper a mechanism which explains these observations is proposed. It is shown that, owing to the small but finite parallel electric field developed by ICW's in a multicomponent plasma (e.g. containing minor He$^+$ ions), electrons having parallel velocities close to the Alfven velocity (at the equator) can be trapped in the potential troughs of the ICW. Then, taking into account the inhomogeneity along geomagnetic field lines, it is shown that the increase of the parallel phase velocity of the ICW as it leaves the equator implies a parallel acceleration of these trapped electrons. The maximum parallel energy which is reached (a few tens of eV) is in agreement with observations; it is obtained by matching the trapping force (proportional to $E_\parallel$) to the detrapping force due to the inhomogeneity along field lines.
J. Geophys. Res., A, Paper [illegible]

5755 (Plasma Instabilities)
EFFECTS OF ENERGETIC HEAVY IONS ON ELECTROMAGNETIC ION CYCLOTRON WAVE GENERATION IN THE PLASMAPAUSE REGION
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An expression for the linear electromagnetic ion cyclotron convective growth rate has been derived, considering multiple ions in the energetic anisotropic component of the plasma, (which provides the free energy for the instability) as well as in the cold component of the plasma. This represents a modification of recent treatments investigating EMIC growth rates which have considered only hydrogen ions in the energetic component. Four major effects on the growth and propagation characteristics result from inclusion of heavy ions in the energetic component. Some wave growth occurs at low frequencies below the corresponding marginally unstable wave mode for each heavy ion. Enhanced quasi-monochromatic peaks in the convective growth rate appear just below the O+ and He+ gyrofrequency and can be quite pronounced for certain plasma conditions. Stop bands, decreased group velocity and other effects normally attributed to cold heavy ions can be produced or enhanced by heavy ions in the energetic plasma component. Partial or complete suppression of wave growth at frequencies above the marginally unstable wave mode for a particular energetic heavy ion can greatly alter the growth rates that would occur in the absence of this energetic heavy ion.

The expression for the linear EMIC convective growth rate along with appropriate plasma parameters was used to investigate the nature of linear wave growth in the plasmapause region. The frequencies of peaks in the convective growth rate given by this model compare favorably with wave measurements in this region.

It is conceivable that through wave-particle interactions, EMIC waves could supply the energy source for various plasmapause region phenomena such as the O+ torus, the plasma cloak, and stable auroral red (SAR) arcs.
J. Geophys. Res., A, Paper 3A1987
5763, 5780

5760 Plasma motion, convection, or circulation
BANDS OF IONS AND ANGULAR V'S: A CONJUGATE MANIFESTATION OF IONOSPHERIC ION ACCELERATION
J. D. Winningham and J. L. Burch (Department of Space Sciences, Southwest Research Institute, 6220 Culebra Rd., San Antonio, TX 78284), R. A. Frahm

Data from the hot plasma instruments on the Dynamics Explorers 1 and 2 spacecraft have been used to study the injection, drift, and subsequent precipitation of suprathermal positive ions in the auroral zone. The observation at both high and low altitudes of electron inverted-"V" events in the boundary plasma sheet (BPS) and of ion "bands" (energy decreasing with decreasing latitude) in the adjacent central plasma sheet (CPS) leads to the following ion injection model: upward-moving energetic ion beams are injected onto BPS magnetic field lines by the electrostatic potential drops associated with electron inverted V's. As the ion beams move toward the equator and into the conjugate hemisphere they are convected to lower latitudes and into the CPS. The energy-latitude dependence of the ion bands, coupled with concurrent ion composition measurements, indicate that the ion distributions are primarily O$^+$, in agreement with their postulated ionospheric source.
J. Geophys. Res., Space, Paper 3A1926

5770 Short-period variations of magnetic field
ON THE RELATIONSHIP BETWEEN MORNING SECTOR IRREGULAR MAGNETIC PULSATIONS AND FIELD ALIGNED CURRENTS
H. J. Engebretson (Department of Physics, Augsburg College, Minneapolis, MN 55454), L. J. Cahill, Jr., T. A. Potemra, L. J. Zanetti, R. L. Arnoldy, S. B. Mende and T. J. Rosenberg

Data from search coil magnetometer, riometer, and photometer instrumentation at Siple, Antarctica are compared with vector magnetometer data from south polar passes of the MAGSAT satellite for three magnetically disturbed days in early 1980. Two kinds of association were found between irregular pulsation activity in the 0.5–40 s frequency band (Pi 1) observed on the ground and magnetospheric-ionospheric currents measured from space. 1) During each MAGSAT polar pass in the morning sector the level of Pi 1 activity correlates well with the intensities of three-dimensional current systems. Fine structure was often observed in the field aligned currents during periods of intense Pi 1 activity. Birkeland currents include 2–10 s (10–70 km) structured perturbations evident in the transverse components of the field, most likely indicating filamentary currents. 2) The pulsations observed at Siple in the morning sector include an asymmetric class of fluctuations in dB/dt whenever the Region II field aligned currents extend to [illegible] in [illegible] latitude ... [illegible] activity.
J. Geophys. Res., [illegible]

5770 Short-period variations of magnetic field
SHORT-PERIOD MAGNETIC PULSATIONS ASSOCIATED WITH PERIODIC VLF EMISSIONS AT SYOWA
N. Sato (National Institute of Polar Research, Tokyo, Japan)

Continuous correlation between periodic VLF emissions and short-period magnetic pulsations was found at Syowa Station (L=6.1) in Antarctica. Fortunately, the periodic VLF emissions were recorded simultaneously on the ground at Syowa and on ISIS-2 satellite. At ISIS-2 satellite [illegible] effect [illegible] periodic emissions. Located at [illegible] wide latitude range from L = 3.5 to [illegible] and also in the region about 2 hours apart from Syowa in magnetic local time. From the ground data, the intensity of the H component of magnetic pulsations associated with the periodic VLF emissions is about 0.02 nT, and approximately five times larger than that of the D component of magnetic pulsations. Magnetic pulsations associated with the periodic emissions have constant frequency and show a "fire-like" frequency-time spectrum. For the origin of the short-period magnetic pulsations it is suggested that the periodic precipitating electron fluxes induced by periodic VLF waves would modify the ionospheric conductivity. The periodic enhancements of conductivity in the ionospheric D and E regions would modify the S_q^p current flows in the ionosphere, resulting in the magnetic variations observed on the ground. (Periodic VLF emission, short-period magnetic pulsation, S_q^p current.)
J. Geophys. Res., A, Paper [illegible]

5785 Whistlers
A STUDY OF PARTICLE TRAPPING BY WHISTLER MODE WAVES IN THE GEOMAGNETIC FIELD: THE EARLY DEVELOPMENT OF THE VLF QUIET BAND
J.P. Matthews, Y. Omura and H. Matsumoto (Radio Atmospheric Science Center, Kyoto University, Uji, Kyoto 611, Japan).

The interaction between a coherent whistler mode signal and the equatorial energetic electron population near L = 4 has been studied using a computer simulation technique. Results show that trapping of particles by the wave at locations removed from the equator can cause a distortion in the equatorial distribution function, and have an important influence on the growth or damping of broad band hiss. For a positive gradient in the incident flux with respect to parallel velocity there is an intensification of growth above the frequency of the coherent signal. Below the signal frequency hiss is strongly damped over a range of frequencies which we interpret as a simulated VLF Quiet Band. In this model the frequency width of the Quiet Band varies as the square root of the amplitude of the causative coherent signal. (Phase trapping, whistlers, Quiet Bands).
J. Geophys. Res., Space, Paper 3A1092

5790 Instruments and techniques (Electron density)
ROCKET OBSERVATIONS OF ELECTRON DENSITY IN THE NIGHTTIME E REGION USING FARADAY ROTATION
L. G. Smith (Aeronomy Laboratory, Department of Electrical Engineering, University of Illinois at Urbana-Champaign, 1406 West Green Street, Urbana, Illinois, 61801) and B. F. Gilchrist

A rocket radio propagation experiment is described in which the electron density profile of the nighttime E region is obtained with an accuracy of 1×10$^{?}$ cm^{-3}. The factors limiting the accuracy of the experiment are found to be related to atmospheric and receiver noise and to the use of a magnetometer to determine the spin rate of the rocket. The Fourier analysis used for the frequency measurement may also contribute error under conditions of steep electron density gradients. The accuracy being achieved appears to be adequate for present applications of the experiment.
Rad. Sci., Paper 4S0029

5799 General (Satellite-Magnetosphere Interactions)
VOYAGER OBSERVATIONS OF JOVIAN MILLISECOND RADIO BURSTS
J. K. Alexander and M. D. Desch (Planetary Magnetospheres Branch, Laboratory for Extraterrestrial Physics, Goddard Space Flight Center, Greenbelt, MD 20771)

Voyager Planetary Radio Astronomy data collected over 30-day intervals centered on the two close encounters with Jupiter have been utilized to study the characteristics of millisecond-duration radio bursts (s-bursts) at frequencies between 5 and 15 MHz. In this frequency range, s-bursts are found to occur almost independently of Central Meridian Longitude and to depend entirely on the phase of Io with respect to the observer's planetocentric line of sight. Individual bursts typically cover a total frequency range of about 1.5 to 3 MHz, and they are usually strongly circularly polarized. Most bursts in a particular s-burst storm will exhibit the same polarization sense (either right-hand or left-hand), and there is some evidence for a systematic pattern in which one polarization sense is preferred over the other as a function of Io phase and Central Meridian Longitude. These data are all suggestive of a radio source that is located along the instantaneous Io flux tube and that extends over a linear dimension of ~ 5000 km along the field lines in both the northern and southern hemispheres.
J. Geophys. Res., A, Paper 4A0001

Water Resources Research

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